Utilization of DIY Local Natural Resources as Raw Materials in Making Environmentally Friendly Antibacterial Biocomposites

by Prof. Dr. Dra. Eli Rohaeti, M.Si./NIP. 19691229 199903 2 001 Prof. Dr. Dra. Isana Supiah Yosephine Louise, M.Si./NIP. 19610923 198812 2 001 Prof. Dr. Endang Widjajanti L.F.X., M.S./NIP. 19621203 198601 2 001 Dr. Suwardi, S.Si., M.Si./NIP. 19670722 199512 1 001 Dr. Kun Sri Budiasih, M.Si./NIP. 197202

ABSTRACT

The background of the PTNBH collaboration research between UNY and UNS is that the target of the Indonesian nation before 2030 is to become the top 5 producers of bioplastics, biofuels and biocomposites. The problem currently encountered by the Indonesian nation is that it is still dependent on imported materials, even though the need for biocomposite products as textile materials antibacterial and antifungal are a must and non-negotiable. Several textile industries require restrictions on the use of chemicals as well as requirements for multifunctional textile products with antibacterial, anti-UV and self-cleaning properties, so the development of multifunctional textiles using environmentally friendly chemicals is a requirement that must be met. Then the high level of cassava peel waste and sugarcane bagasse waste that can be utilized, limitations, expensive textile materials with antibacterial properties that can be used for biomedical applications, as well as the need to develop textile materials with superior quality and multifunctionality, both as materials that can protect UV rays, soil-release, as well as as an antimicrobial agent was the background for this research. The aim of the research to be carried out is to produce a biocomposite based on nanocellulose and chitosan, silver nanoparticles prepared using algae and stabilizers, as well as to produce an effective method for producing a biocomposite with optimum self-cleaning properties, as well as developing a new material in the form of a self-cleaning textile material with the properties antibacterial and antifungal as well as anti-UV through coating with silane compounds and silver nanoparticles as well as efforts to modify cassava peel waste and sugarcane bagasse into nanocellulose. The research stages that will be carried out include the preparation of nanocellulose from cassava peel waste and sugarcane bagasse waste, preparation of silver nanoparticles using various types of algae (brown algae, red algae and green algae) using reflux, microwave and ultrasound methods, as well as characterization of nanoparticles using UV equipment. -VIS, Particle Size Analyzer (PSA), Scanning Electron Microscopy (SEM), DTA, TGA, DSC tools, FTIR tools, and antimicrobial activity tests. Next, the application of metal nanoparticles and chitosan was carried out as well as a silane compound coating on the nanocellulose product. The resulting product is then further characterized to determine its application, including functional group analysis, thermal properties, mechanical properties, antimicrobial activity test, contact angle measurement, and anti-UV test. Several characterizations of nanocellulose, nanoparticles and composites using SEM, DTA and TGA were carried out at research partners (UNS). The targeted mandatory output is in the form of submitted articles to International Journals and MoU documents. Additional outputs targeted are Patent Registration and publication of international seminar proceedings and draft reference books. Technology Readiness Level is 3.

Kata Kunci: *biocomposite, chitosan, sugarcane bagasse, and nanocellulose*